



2022 SUSTAINABILITY PLAN



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1. NASA Sustainability Plan Summary

NASA recognizes the urgency and the need to pursue and achieve the goals of the Executive Order. The Agency is committed to achieving these goals. Implementing actions are embedded in NASA's 2022 Strategic Plan, including NASA's infrastructure objective to "[r]ebuild and right-size NASA's infrastructure and technical capabilities to advance the Nation's science and aerospace leadership, while supporting environmental stewardship, sustainability, and enhancing resource conservation efforts."

2. Priority Actions Towards Goals

A. 100 Percent Carbon Pollution-Free Electricity (CFE)

NASA's strategy to increase CFE to 100 percent by 2030, including 50 percent on a 24/7 basis, is to pursue all options available to the Agency, including purchased CFE, on-site CFE and storage, purchased energy attribute certificates, and grid-supplied CFE. Priority actions in Fiscal Year (FY) 2022 include the following:

- Continue building on-site CFE generation/storage and/or purchasing CFE where feasible, using appropriated funds and energy performance contracts.
- Continue participation in the Federal Energy Management Program Energy Storage Initiative to identify and procure resilient CFE projects (two site assessments "in progress").
- Continue assessing opportunities to partner with utility providers through enhanced use lease (EUL) agreements to develop on-site CFE generation on underutilized real property. As of FY 2022, NASA is hosting a total of 104.5 megawatts (MW) of photovoltaic (PV) systems at Kennedy Space Center (KSC) (two systems totaling 84.5 MW) and one system of 20 MW at Michoud Assembly Facility, which feed directly into the utility providers' grids.

B. 100 Percent Zero-Emission Vehicle (ZEV) Fleet

NASA's strategy for a 100 percent ZEV fleet is to first reduce the need for assets, then acquire "right-sized" ZEVs when current petroleum-powered fleet assets reach end of life. This includes forecasting future ZEV inventory and development and activation of electric vehicle supply equipment (EVSE) to match the outyear delivery of ZEVs. Priority actions in FY 2022 include the following:

- Continue annual utilization reviews to identify the smallest-sized vehicle to best meet mission requirements and to reduce the need for vehicle assets from inventory.
- Establish agreements with utility providers to install EVSE (28 are "in progress" in FY 2022, owned and maintained by a utility for 10 years before transition to NASA property).
- Fund EVSE infrastructure (two EVSEs installed and 80 more EVSEs will be "in progress" by the end of FY 2022).

C. Net-Zero Emissions Buildings, Campuses, and Installations

i. Design and Construction for Net-Zero Emissions (NZE)

NASA's current strategy to achieve an NZE building portfolio by 2045, including 50 percent emissions reduction by 2032, is to ensure all new construction/major renovation building projects are high-performance sustainable facilities. NASA will also evaluate building electrification strategies and deep energy retrofits as well as modernization of aging utilities

infrastructure. NASA is committed to reducing the facility portfolio and the usage of energy and water. Priority actions beginning with planning in FY 2022 include:

- Design new construction and major renovations to be net-zero emissions capable (except when impractical or infeasible due to facility operational requirements such as a wind tunnel).
- Increase use of low embodied carbon building materials. NASA has identified an upcoming infrastructure project, Replacement of the Wallops Island Causeway Bridge, that will use the ENVISION certification system for infrastructure projects as a guide for ensuring project resilience and sensitivity to the fragile environment where construction will occur.
- Continue an aggressive demolition program through the identification and removal of inefficient low-mission facilities, reducing carbon emissions and waste.
- Improve building efficiencies and operations of mission-required facilities by continuing condition-based maintenance strategies and increasing training to facility managers.

ii. Increasing Energy Efficiency

NASA ensures energy and water affordability, reliability, and sustainability through utility supply cost management, life-cycle cost-effective project implementation, and facility operation and maintenance optimization. Priority actions in FY 2022 include the following:

- Continue implementing energy conservation projects with Construction and Environmental Compliance and Restoration (CECR) appropriations and EUL net revenue (revenue beyond expenses of hosting lease agreement tenants), and through energy performance contracts.
- Institutionalize Department of Energy (DOE) 50001 Ready across all NASA sites, including setting annual site-specific, data-driven energy reduction goals, with a focus on significant energy uses, to be tracked beginning FY 2023.

iii. Increasing Water Efficiency

NASA's strategy to reduce potable water consumption is to upgrade infrastructure, install metering, and reduce water waste. In addition to the energy efficiency actions listed above, which also improve water efficiency, priority actions in FY 2022 include the following:

- Continue to improve water efficiency through water infrastructure and metering projects with CECR appropriations and through energy performance contracts.
- Conduct water leak detection and water balance studies.
- Install advanced water treatment systems on major cooling towers to reduce water losses.
- Per 50001 Ready, establish annual site-specific, data-driven water reduction goals, with a focus on significant water uses, to be tracked beginning FY 2023.

D. Reducing Waste and Pollution

NASA's strategy to divert at least 50 percent of non-hazardous solid waste by 2025 and at least 75 percent by 2030, is to continue to advance waste prevention practices that save natural resources, reduce pollution, reduce waste toxicity, and save money. These practices have already resulted in a diversion rate exceeding 75 percent for the past three years. Priority actions in FY 2022 include the following:

- Use NASA's Recycling and Sustainable Acquisition community of practice to reduce waste generation, prioritize reuse, and improve waste diversion through policy, outreach, measurement/verification, and collaboration on best practices.
- Use functional reviews to improve NASA Center Environmental Management Systems, Energy Management Systems, and pollution prevention, sustainability, and sustainable procurement programs.

E. Sustainable Procurement

NASA's strategy for increasing acquisition of sustainable products and services is to continue training acquisition personnel, monitor the contracting process, and improve sustainable procurements reporting in the Federal Procurement Data System (FPDS). Priority actions in FY 2022 include the following:

- Revise NASA procurement processes to support compliance with Federal Acquisition Regulation clause prescriptions and FPDS reporting requirements.
- Review training and identify changes to align with current requirements.

F. Climate- and Sustainability-Focused Federal Workforce

NASA strategic planning includes a goal and multiple initiatives to “foster a proactive, sustainability-focused culture Agency-wide.” Priority actions in FY 2022 include the following:

- Establish an internal collaboration site for sustainability and climate leadership, goals, and progress across the Agency.
- Internally advertise the “Sustainability Speaker Series for the Federal Community.”
- Continue internal climate and sustainability education and training.
- Participate in the Federal Climate Action Plan community network.

G. Incorporating Environmental Justice

NASA has also created an Equity Action Plan in support of the Biden-Harris Administration's Executive Order 13985, “Advancing Racial Equity and Support for Underserved Communities Through the Federal Government.” NASA's Equity Action Plan provides a framework and strategy for how the Agency intends to understand and address the barriers that prevent equitable access to science, technology, and opportunities to work with and learn from NASA. Priority actions in FY 2022 include the following:

- Track progress in key areas, which are impactful steps toward improving diversity, equity, inclusion, and accessibility both internally and externally to NASA: 1) leverage Earth science and socioeconomic data to help mitigate environmental challenges in underserved communities, and 2) expand access to climate data to limited English proficient populations within underserved communities.
- Improve the accessibility and awareness of climate and environmental data and information NASA collects and generates, including updating public-facing websites, improving accessibility to grants, and building relationships with diverse community partners.

H. Accelerating Progress through Partnerships

NASA leverages public and private partnerships to accelerate progress toward accomplishing Agency goals. Priority actions in FY 2022 include the following:

- Partner with DOE's National Renewable Energy Laboratory to develop the Agency Resilience Framework, as well as to conduct Center resilience assessments that include energy/water infrastructure. These efforts will also leverage Climate Adaptation Science Investigators Work Group data/models.
- Coordinate with the Department of Defense (DOD) and General Services Administration to import multi-tier supplier information into a cyber-secure aggregated database to perform financial, environmental, and other supply chain risk assessments as well as report optimized risk mitigation options. NASA is forming relationships with other Government agencies to import more comprehensive supplier, product, and financial information.

3. Progress Examples

Transitioning to 100 percent CFE by 2030: NASA used CECR Construction of Facilities (CoF) Energy Savings Investments funds to execute onsite CFE generation and storage during FY 2022. NASA's Jet Propulsion Laboratory energized a 0.9 MW-direct current solar PV system on a parking structure, which annually produces 1.5 gigawatt-hours (GWh) onsite CFE. NASA's White Sands Test Facility (WSTF) awarded a 0.6 MW battery storage system subcontract for an existing solar PV system that will provide flexibility in timing CFE usage to support the 24/7 CFE goal. WSTF is preparing to award a subcontract that will design and install a solar PV system at NASA's White Sands Complex.

NASA awarded a \$19.4 million (M) Utility Energy Service Contract (UESC) at KSC in FY 2021, which includes a PV system that will annually produce 3.0 GWh onsite CFE; KSC began design and construction in FY 2022.

Increasing energy and water efficiency by 2030: NASA is using CECR CoF Energy Savings Investments funds to execute multiple program year investments, including \$7M for NASA's Ames Research Center (ARC) to improve building energy efficiency, NASA's Stennis Space Center (SSC) to implement energy improvements, and NASA's Armstrong Flight Research Center to optimize a data center heating, ventilation, and air conditioning system, which will annually save \$0.8M and 29.7 billion British thermal units (BBtu); \$8M for NASA's Glenn Research Center (GRC) to upgrade energy management control systems and NASA's Marshall Space Flight Center to increase thermal energy storage, which will annually save \$0.8M and 102.0 BBtu; and a CoF water distribution system improvement project, which will replace, repair, and upgrade potable water, sewage, and drainage systems at several NASA Centers. Efforts include repair and upgrade of the Vehicle Assembly Building water distribution system at KSC as well as other work at GRC and SSC.

NASA is using EUL net revenue to execute its Existing Building Commissioning Program in 16 buildings at six NASA Centers for a total of 1.2M gross square feet [\$6.2M including \$4.9M direct-funded UESC].

NASA awarded a \$28.1M UESC at NASA's Goddard Space Flight Center in FY 2022 that will annually save \$1.9M, 132.3 BBtu, 4,800 metric tons of carbon dioxide equivalent greenhouse gas emissions, and 630,000 gallons of water.

Reducing Waste and Pollution: At many NASA Centers, NASA is reducing waste by sorting food and compostable material waste and diverting it away from landfills, which will help NASA achieve at least 50 percent landfill diversion by 2025 and 75 percent by 2030. To address contamination, ARC uses shadowbox dioramas that sit atop collection bins to visually demonstrate which items should be discarded to which bin (compost bin, recycle bin, or landfill bin). The compost bin collects food scraps and food-soiled compostable containers. This project also aids in meeting California goals to reduce organic waste disposal.

NASA is minimizing waste by source reduction of single-use plastic bags. At multiple NASA Centers, including KSC and WSTF, waste collection is moving toward using a centralized location, eliminating or reducing the need for single-use plastic bags in each small deskside collection bin. KSC has recently adjusted janitorial contract language to stop deskside waste

collection pickup thus eliminating a minimum estimation of 80,000 single-use plastic bags from the landfill per year.

Sustainable Procurement: NASA is developing training on the various aspects of sustainable procurement covering all phases of procurement.

Climate- and Sustainability-Focused Federal Workforce: To better engage, educate, and train the Federal workforce, NASA is promoting the Office of the Federal Chief Sustainability Officer's Speaker Series for the Federal Community. In addition, the Agency is holding a NASA-wide hybrid Environmental Conference in FY 2022, one focus of which is to immerse NASA's workforce in the principles of sustainability and the progress NASA is making and encouraging throughout the Agency.

Accelerating Progress through Partnerships: NASA, in collaboration with several DOD organizations, is offering a next-generation hybrid supply chain software to complement other supply chain risk management capabilities. The software being offered uses real-time environmental data as well as program and industry financial benchmark data to effectively model and simulate climate change impacts on both the product and supplier economic viability throughout a product life-cycle. Recent activities include updating the capabilities of the graphical user interface to improve geographic supplier visualization against flood, wildfire, hurricanes, and other weather events.